BIOC 301 Course Syllabus

Spring 2018 - Keck Hall 100 - 11 to 11:55 AM MWF

INSTRUCTORS: **Dr. Arnold Revzin** (Arnold.Revzin@rice.edu) – Office to be decided (01/08-02/26, 2018)
Dr. Natasha Kirienko (kirienko@rice.edu) – W200N GRB Hall (02/28-04/20, 2018)

GRADUATE TAs: Elissa Tjahjono (et19@rice.edu), Quinton Anderson (qla1@rice.edu)

UNDERGRADUATE TAs: Rohit Gupta (rg34@rice.edu), Rick Mukhopadhyay (am107@rice.edu), Bharathi Selvan (bs50@rice.edu)

TEXTBOOK: **Lehninger Principles of Biochemistry (7th Ed.)**

ONLINE: **CANVAS** Bioc 301 Spring 2018 site

TUTORIAL SESSIONS: ***12:00-12:45 PM MWF Keck 100 after class (instructors)***
7:00 – 9:00 PM T and Th – to be arranged

REVIEW SESSIONS: 7:00 – 9:00 PM, Scheduled Mon. or Wed. or Fri. before each test, rooms to be arranged.

COURSE OBJECTIVES AND LEARNING OUTCOMES: Bioc 301/302 is a one-year course in Biochemistry. BIOC 301 presents the fundamentals of how living organisms perform the chemistry essential to life. BIOC 302 will expand on the fundamentals from BIOC 301 and will focus on metabolism and molecular physiology in greater detail. Objectives of Bioc 301 include:

- using the nomenclature of biochemistry to describe the chemical structures and properties of biomolecules
- quantifying the activities of proteins (transport, ion exchange, catalysis) using reaction rate theory, experimental data, organic chemical mechanisms, and structural biology.
- developing an understanding of metabolism in terms of catalytic mechanisms, energy coupling, and regulation using the complete oxidation of glucose as the fundamental pathway in all living organisms.

Specific and detailed objectives for each topic of the course are presented at the beginning of each lecture.

Date		Topic	LPOB Book Chapters
1/08	M	Introduction	Ch. 1
1/10	W	Water – A very special molecule	Ch. 2
1/12	F	DNA and RNA – Information and Catalysis	Ch. 8
1/15	M	**MLK Day, no class**	
1/17	W	DNA and RNA Structure	Ch. 8
1/19	F	Survey of DNA and RNA Metabolism	Ch. 24-28
1/22	M	Amino Acids – Building Blocks of Life	Ch. 3
1/24	W	Protein Methods – Tools of the Scientist	Ch. 3
1/26	F	Protein Methods – Part II	Ch. 39/5
1/29	M	Proteins Chemistry - Interrogating the molecule	Ch. 3
1/31	W	Protein Chemistry - Part II	Ch. 3
1/31	W	**(Evening review 7-9 PM TBA)**	
2/02	F	**EXAM 1**	
2/05	M	Protein Secondary and Tertiary Structural Elements	Ch. 4
2/07	W	Protein Folding and Dynamics	Ch. 4
2/09	F	**Spring recess, no class**	
2/12	M	Protein Folding and Dynamics	Ch. 4
2/14	W	Protein-Structure/Function- Myoglobin/Hemoglobin	Ch. 5
2/16	F	Protein-Structure/Function- Hemoglobin	Ch. 5
2/19	M	Enzyme Mechanisms and basic kinetics	Ch. 6 (mostly notes)
2/21	W	Steady state derivations	Ch. 6 (mostly notes)
2/23	F	Inhibition patterns	Ch 6 (mostly notes)
2/23	F	**(Evening review 7-9 PM TBA)**	
2/26	**M**	**EXAM 2**	

2/28	W	Lipids - Terminology and structure	Ch. 10
3/02	F	Lipids, micelles and vesicles	Ch. 11
3/05	M	Lipids - Membrane transport	Ch 11
3/07	W	Introduction to metabolism, ATP coupling	Ch. 13,14
3/09	F	Carbohydrate chemistry	Ch. 7
3/10-3/18		**Spring break, no classes scheduled**	
3/19	M	Introduction to glycolysis	Ch. 14
3/21	W	Glycolysis, oxidation, and ATP formation	Ch. 14
3/23	F	Glycolysis, fermentation, and blood sugar	Ch. 14, 16
3/26	M	Regulation of glycolysis by hormones	
3/28	W	Review (in class and **evening review TBA**)	
3/30	**F**	**EXAM 3**	
4/02	M	Pyruvate decarboxylation and PDH complex	Ch. 14,15
4/04	W	TCA cycle	Ch. 16
4/06	F	TCA cycle	Ch. 16
4/09	M	Electron transport, and mitochondrial complexes	Ch. 13,19
4/11	W	Redox potentials, O_2 reactions, ATP synthesis	Ch. 19
4/13	F	Oxidative phosphorylation, Chemiosmotic theory	Ch. 19
4/16	M	Photosynthesis and review of energy metabolism	Ch. 19,20
4/18	W	Anapleroic pathways and gluconeogenesis (for final only)	Ch. 14,15
4/18	W	**(Evening review 7-9 PM TBA)**	
4/20	**F**	**EXAM 4**	

A COMPREHENSIVE FINAL EXAM will be given during the final examination period.

Rules and information for Bioc 301:

Bioc 301/302 is a one-year course in Biochemistry. The first semester will be spent developing the fundamentals of how living organisms perform the chemistry essential to life. This means learning the nomenclature of this chemistry and understanding the chemical structures and properties of the building blocks that constitute proteins and nucleic acids. The second semester will examine metabolism and molecular physiology.

Bioc 301 will meet at M/W/F at **11:00-11:50 A.M.** In addition to the lectures, there will be voluntary tutorial sessions each week to assist you in understanding lecture material and for discussion of problem set solutions. It is very important to read the text. The lectures cover the most important principles, and the book provides important background material. In several cases, additional ideas and derivations will be provided in the lecture handouts.

There are **four mandatory problem sets,** one for each exam period. These problems are designed to hone your skills for the sorts of questions that are likely to appear on the exams. The rules for the problem sets are as follows. You are honor-bound to work the problems yourself. **No direct copying from old exams, problem sets, or from other students is allowed.** However, you can and are expected to seek help where you can, including the instructors, TAs and other students.

There are four exams and one final. All exams are closed book and will be given in the Keck Hall 100 (same room as lectures). Your scores on these exams will weighted as shown below:

4 Regular exams x 100	= 400
4 Problem sets x 25	= 100
1 Final exam x 200	= 200
TOTAL POINTS	= 700

Exams will be excused only for a verified illness. Please contact the instructor **prior** to the exam if you will be unable to attend at the scheduled time. Arrangements will be made to take the exam at an **earlier** time. Exams will not be given after the regularly scheduled time. In the event of illness or major family emergency, the student must provide a letter or detailed message prior to the exam that explains their absence consistent with the Rice University Honor Code.

Missed exams will not be made up. If a legitimate excuse is presented and accepted by the instructor, your grade will be calculated by averaging the remaining scores on other exams. You will have one week following the return of an exam to ask in writing for a regrade on your exam. *The entire exam will be regraded (this*

does not apply to an arithmetic error), so be forewarned that you may suffer a loss of points as well as a gain during a regrade.

The syllabus indicates topics to be covered in each lecture. Although only the final exam is cumulative, each exam builds on knowledge gained earlier in the course and thus terminology and principles will often appear throughout the semester an on all exams. **The required text is Lehninger's Biochemistry (7th Ed.)** It is used both semesters and is a good reference. Class notes, answers to problem sets, and copies of the old exams will be placed on CANVAS.

Accommodations for students with disabilities:

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with us during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Ley Student Center.